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New records of *Dasyhelea* Kieffer, 1911 from Sweden, with descriptions of two new species (Diptera: Ceratopogonidae)

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Abstract. Based on intensive collecting from various sites in Sweden, the genus *Dasyhelea* Kieffer, 1911 was reviewed and the number of species now known from the country increased from five to twenty. Among the new species recorded there are two species described as new to science, *D. dominiakae* sp. nov. and *D. gothlandica* sp. nov., both in the subgenus *Dicryptoscena* Enderlein, 1936. The following subgenera are now documented from Sweden: *Dasyhelea*, *Dicryptoscena*, *Pseudoculicoides* Malloch, 1915, *Prokempia* Kieffer, 1913 and *Sebessia* Remm, 1979, the two latter subgenera being reported for the first time.

Keywords. Biting midges, taxonomy, systematics, new species, Malaise trap.

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Introduction

The genus *Dasyhelea* Kieffer, 1911 is classified in the subfamily Dasyheleinae Lenz, 1934 and is cosmopolitan in distribution. More than 600 *Dasyhelea* species are known, representing one-tenth of all described Ceratopogonidae species in the World (Borkent 2015). The highest diversity is described from large countries in the northern hemisphere, i.e., China, USA and Russia (Borkent 2015). The immature stages of *Dasyhelea* inhabit a wide range of moist and terrestrial habitats, like peat bogs (Domniak & Szadziewski 2006), rockpools (Wirth 1978), plants of *Nepenthes* Linnaeus (Wirth & Beaver 1979), tree sap (Domniak 2005) and in mushrooms (Graves & Graves 1985). The short-lived adults (Zilahi-Sebess 1931) are often found in or around the vegetation near the breeding sites (Waugh & Wirth 1976). The structure of the mouthparts in both sexes is similar, i.e., reduction of both mandibles and maxillae (Glukhova 1981), and both males and females feed on nectar and honeydew and according to Wirth (1956) they can act as pollinators of plants such as rubber trees (*Hevea brasiliensis* (Willd. ex A.Dr. Juss.)).

The most recently described ceratopogonid species from Sweden, which are still valid, are *Forcipomyia squamigera* Kieffer, 1916 and *Bezzia pilipennis* Lundström, 1916. Reports thereafter added more species

records for the country, resulting in a record list of approximately one hundred species of Ceratopogonidae for Sweden (Rehnberg & Brodin 2010; Nielsen *et al.* 2010; Szadziewski *et al.* 2012). This may be compared to 184 species in Estonia, 211 in Poland and 256 in Germany (Szadziewski *et al.* 2012), which indicates that Sweden might have been undersampled historically compared to some other countries. Efforts were therefore made in order to more carefully examine the Swedish diversity using recently trapped material from various sites. The Swedish *Dasyhelea* include five species previously recorded from Sweden: *D. pallidiventris* (Goetghebuer, 1931), *D. corinneae* Gosseries, 1991, *D. turficola* Kieffer, 1925, *D. modesta* (Winnertz, 1852) and *D. notata* Goetghebuer, 1920 (Dominiak & Szadziewski 2010). With this report the number of *Dasyhelea* species in Sweden increases to 20, a low number compared to the more than 60 species recorded from the rest of Europe (Szadziewski *et al.* 2012).

Material & Methods

The specimens in this study were collected from Djäkabygds Bokbacke during the summer of 2005, from Limhamns kalkbrott (limestone quarry) during the summer of 2009, and various other localities in Sweden during the spring and summer of 2011. Specimens were collected in Malaise traps and in sweep nets. At the lab they were stored in 80% ethanol in deep freezers. After sorting and preliminary identification, the whole body was cleared using Proteinase K as part of DNA extraction and sequenced for mitochondrial cytochrome I (COI) according to the methods described in Strandberg & Johanson (2010). The COI sequences were used to associate males and females using MEGA 5.2.2 (Tamura *et al.* 2011), applying the settings in Stur & Borkent (2014). The head, wings and abdomen/genitals from the thorax and one leg from each leg pair were mounted under separate cover slips on microscope slides using Euparal as permanent mounts. Specimens from Limhamns kalkbrott and Bunkeflostrand are stored at the Museum of Zoology, Lund University, Sweden (MZLU) while the rest are deposited at the Department of Zoology, Swedish Museum of Natural History (NHRS).

In the descriptions, specimens were measured for each character and ratios and measurements of the antennae (AR), palpi (PR_(III)), wings and costal vein (CR) were obtained following the methods described by Dominiak (2012). Measurements are given for the holotype as well as the range of variation in each character for the paratypes (n = number of specimens examined).

Results

Class Insecta Linnaeus, 1758
Order Diptera Linnaeus, 1758
Family Ceratopogonidae Newman, 1834
Subfamily Dasyheleinae Lenz, 1934

Genus *Dasyhelea* Kieffer, 1911

Dasyhelea Kieffer, 1911: 5. Type species: *Dasyhelea halophila* Kieffer, 1911: 5 (by monotypy).

Subgenus *Dasyhelea*

Dasyhelea (*Dasyhelea*) *bensoni* Edwards, 1933

Dasyhelea bensoni Edwards, 1933: 91.

Dasyhelea vernalis Remm, 1979: 56.

New record

SWEDEN: 2 ♂♂, Gällivare, Muddus National Park, Lake Muddus, 67.030916° N, 20.254950° E, 418 masl, loc. 036-01, Malaise trap, 7–20 Jun. 2011, leg. H. Gustafsson (NHRS).

Distribution

Great Britain, Norway, Estonia, Romania, Russia (Amur Oblast, Yakutia) (Dominiak & Szadziwski 2010).

Biology

Specimens were collected on mire close to a lake during mid June. Previously *D. bensoni* has been collected from the end of May to mid July (Edwards 1933; Remm 1979).

Dasyhelea (Dasyhelea) bilineata Goetghebuer, 1920

Dasyhelea bilineata Goetghebuer, 1920: 45.

Dasyhelea insignipalpis Kieffer, 1925a: 62 (as *D. versicolor* var. *insignipalpis*).

Tetraphora saxicola Edwards, 1929: 426.

Dasyhelea geleiana Zilahi-Sebess, 1931: 321.

Dasyhelea montana Zilahi-Sebess, 1940: 48 (as *D. dufouri* var. *montana*).

Dasyhelea lithotelmatica Strenzke in Thienemann, 1950: 178.

Dasyhelea tecticola Remmert, 1953: 334.

Culicoides dieuzeidei Vaillant, 1957: 265.

Dasyhelea karelica Glukhova & Brodskaya, 1997: 443.

New record

SWEDEN: 1 ♂, 1 ♀, Malmö, Bunkeflostrand, Malaise trap, 16 Jul.–1 Aug. 2009, leg. B.W. Svensson (MZLU).

Distribution

Norway, Finland, Russia, Estonia, Great Britain, Ireland, Belgium, Germany, Poland, Czech Republic, Slovakia, France, Switzerland, Austria, Italy, Croatia, Hungary, Romania, Ukraine (Crimea), Bulgaria, Spain, Gibraltar, Algeria, Turkey (Dominiak & Szadziwski 2010).

Biology

The specimens were collected in an area with shore meadows on the west coast in the south of Sweden. The larva inhabits shallow water bodies; both natural and artificial and preimaginal stages are very tolerant of desiccation and temperature fluctuations (Zilahi-Sebess 1931; Valkanov 1941; Disney 1975).

Remarks

The male keys out as *D. bilineata* in Dominiak (2012). The associated female has the subgenital plate with broad lateral processes and a more hearth-shaped notum in contrast to the isosceles triangular-shaped notum of *D. bilineata* shown in Dominiak (2012).

Dasyhelea (Dasyhelea) caesia Remm, 1993

Dasyhelea caesia Remm, 1993: 193.

Dasyhelea lugensis Brodskaya, 1995: 9.

New record

SWEDEN: 1 ♂, Haninge, Tyresta National Park, Löpanträsk, 59.182483° N, 18.303100° E, 40 masl, loc. 025-07, Malaise trap, 19 Jul.–2 Aug. 2011, leg. J. Strandberg (NHRS).

Distribution

Russia (Leningrad Oblast, Yakutia), Poland (Dominiak & Szadziwski 2010).

Biology

The specimen was collected in a marsh situated between two lakes with water flowing through. Last instar larvae and pupae of *Dasyhelea caesia* have previously been collected from a small body of water and the littoral zone of lakes in Russia during July (Brodskaia 1995; Przhiboro 2005).

Dasyhelea (Dasyhelea) malleola Remm, 1962

Dasyhelea malleolus Remm, 1962: 119.

New records

SWEDEN: 2 ♂♂, 1 ♀, Gällivare, Muddus National Park, Lake Muddus, 67.030916° N, 20.254950° E, 418 masl, loc. 036-01, Malaise trap, 7–20 Jun. 2011, leg. H. Gustafsson (NHRS); 1 ♂, 3 ♀♀, Gällivare, Muddus National Park, Lake Muddus, 67.030916° N, 20.254950° E, 418 masl, loc. 036-02, Malaise trap, 20 Jun.–3 Jul. 2011, leg. H. Gustafsson (NHRS); 2 ♂♂, Gällivare, Muddus National Park, 67.049916° N, 20.256533° E, 443 masl, loc. 037-01, Malaise trap, 7–20 Jun. 2011, leg. H. Gustafsson (NHRS); 1 ♀, Gällivare, Muddus National Park, 67.049916° N, 20.256533° E, 443 masl, loc. 037-02, Malaise trap, 20 Jun.–3 Jul. 2011, leg. H. Gustafsson (NHRS).

Distribution

Estonia, Norway, Germany, Poland, Czech Republic, Ukraine (Crimea), Spain, Andorra, Algeria (Dominiak & Szadziwski 2010; Stur & Borkent 2014).

Biology

Specimens were collected on mire next to a lake from the beginning of June to the beginning of July.

Dasyhelea (Dasyhelea) flavifrons (Guérin, 1833)

Ceratopogon flavifrons Guérin, 1833: 165.

Ceratopogon obscurus Winnertz, 1852: 45.

Ceratopogon versicolor Winnertz, 1852: 45.

Ceratopogon dufouri Laboulbène, 1869: 158.

Ceratopogon hippocastani Mik, 1888: 185.

Ceratopogon rufithorax Strobl, 1920: 261 (as *C. versicolor* var. *rufithorax*).

Dasyhelea brevitibialis Goetghebuer, 1919: 72.

Dasyhelea goetghebueri Kieffer, 1919: 53.

Dasyhelea sensualis Kieffer, 1919: 55.

Dasyhelea lignicola Kieffer, 1919: 57.

Dasyhelea paludicola Kieffer, 1925b: 152.

Dasyhelea opressa Thomsen, 1935: 285.

Dasyhelea septuosa Borkent in Borkent & Wirth, 1997: 58 (new name for *D. obscura* (Winnertz, 1852)).

New record

SWEDEN: 1 ♂, Nybro, Alsterbro, Alsterån, 56.936536° N, 15.920167° E, Trap ID 1008, collecting event 1743, Malaise trap, 16–22 Jul. 2006, leg. Swedish Malaise Trap Project (NHRS).

Distribution

Estonia, Great Britain, Belgium, Germany, Poland, Czech Republic, France, Austria, Switzerland, Spain, Croatia (Istria), Greece (Crete), Bulgaria, Ukraine (Crimea), Russia (Karachay-Cherkessia), USA (Dominiak & Szadziewski 2010).

Biology

Larvae of *D. flavifrons* can be found in tree sap or tree holes. Flight period May–October (Dominiak 2012).

Remarks

The previous listing of this species as present in Sweden is doubtful as it has only been reported in Rehnberg & Brodin (2010), based on *D. versicolor* (Winnertz, 1852) as listed in Szadziewski *et al.* (1997). We were unable to verify previous records.

Dasyhelea (Dasyhelea) pallidiventris (Goetghebuer, 1931)

Tetrphora pallidiventris Goetghebuer, 1931: 211.

Dasyhelea olivacea Remm, 1962: 117.

Distribution

Sweden, Finland, Estonia, Lithuania, Germany, Poland, Czech Republic, Ukraine (Crimea), Georgia, Azerbaijan, North Korea (Dominiak & Szadziewski 2010).

Biology

Dasyhelea pallidiventris is considered a haloxene, and the larvae inhabit inland saline habitats and the littoral zone of lakes (Szadziewski 1983). Previously recorded from Norrtälje in east-central Sweden (Dominiak & Szadziewski 2010).

Subgenus *Prokempia* Kieffer, 1913

Prokempia Kieffer, 1913a: 163, 179. Type species: *Dasyhelea ornaticornis* Kieffer, 1913a: 180 (designated by Wirth 1973: 358).

Dasyhelea (Prokempia) biunguis Kieffer, 1925

Dasyhelea biunguis Kieffer 1925c: 409.

New record

SWEDEN: 1 ♂, 1 ♀, Älmhult, Stenbrohult, Djäknabygds bokbacke, 56.609133° N, 14.193050° E, Trap ID 24, collecting event 1673, Malaise trap, 31 May–20 Jul. 2005, leg. Swedish Malaise Trap Project (NHRS).

Distribution

Great Britain, Norway, Estonia, Russia (Kaliningrad Oblast) (Dominiak & Szadziewski 2010).

Biology

Specimens collected on a heath with old beeches.

***Dasyhelea (Prokempia) dampfi* Kieffer, 1925**

Dasyhelea dampfi Kieffer, 1925b: 150.

Dasyhelea turfacea Kieffer, 1925b: 151.

Dasyhelea estonica Kieffer, 1925c: 409.

New record

SWEDEN: 1 ♂, Gnosjö, Store mosse, Kittlakull, 57.287233° N, 13.919133° E, Trap ID 41, collecting event 1159, Malaise trap, 3–6 Aug. 2004, leg. Swedish Malaise Trap Project (NHRS).

Distribution

Estonia, Lithuania, Poland, Czech Republic (Dominiak & Szadziewski 2010).

Biology

This specimen was collected at a peat bog in the beginning of August.

Subgenus ***Pseudoculicoides*** Malloch, 1915

Pseudoculicoides Malloch, 1915: 309. Type species: *Ceratopogon mutabilis* Coquilett, 1901: 602 (by original designation).

***Dasyhelea (Pseudoculicoides) arenivaga* Macfie, 1943**

Dasyhelea inconspicua var. *arenivaga* Macfie, 1943: 151.

New records

SWEDEN: 1 ♂, 1 ♀, Gotland, 57.847400° N, 18.811216° E, 3 Jul. 2011, 6 masl, net, leg. J. Strandberg (NHRS); 1 ♂, 3 ♀♀, Gotland, Bästeträsk, 57.899383° N, 18.901083° E, 9 masl, loc. 027-04, Malaise trap, 28 May–12 Jun. 2011, leg. B. Eklund (NHRS).

Distribution

Poland, Czech Republic, Switzerland, Romania, Ukraine (Crimea), Bulgaria, Spain, Algeria, Egypt, Israel, United Arab Emirates (Dominiak & Szadziewski 2010; Szadziewski *et al.* 2011).

Biology

These specimens were collected in a marsh and in a seasonally flooded area next to a lake. *D. arenivaga* is known to visit umbelliferous and tamarisk flowers (Dominiak & Szadziewski 2010).

***Dasyhelea (Pseudoculicoides) calycata* Remm, 1972**

Dasyhelea calycata Remm, 1972: 74.

New record

SWEDEN: 1 ♂, 1 ♀, Torsås, Söderåkra, Påboda, 56.434723° N, 16.070844° E, Trap ID 2046, collecting event 2058, Malaise trap, 1 Sep.–3 Oct. 2008, leg. Swedish Malaise Trap Project (NHRS).

Distribution

Great Britain, Lithuania, Poland, Slovakia, Bosnia and Herzegovina, Ukraine (Crimea), Romania, Bulgaria, Spain, Hungary, Russia (North Ossetia, Tuva, Buryatia), Mongolia (Dominiak & Szadziewski 2010).

Biology

The specimens were collected in a small village garden. Larvae can be found in both fresh and salt-water habitats and are common on inland saline meadows in Poland (Dominiak 2012).

Remarks

The association of the sexes made by Remm (1972) has previously been considered incorrect. The associated female probably belongs to *D. unguistyla* Remm, 1972 (Dominiak & Szadziewski 2010). The female associated in this study by COI sequences differs from the original description in lacking long cerci and in having a subgenital plate with a lumen. According to Dominiak & Szadziewski (2010) the type material is unavailable.

Dasyhelea (Pseudoculicoides) corinneae Gosseries, 1991

Ceratopogon scutellatus Meigen, 1830: 262.

Dasyhelea corinneae Gosseries, 1991: 42 (new name for *D. scutellatus* Meigen, 1830).

Dasyhelea chonetus Yu & Zou in Yu et al., 2006: 279.

Distribution

Great Britain, Sweden, Poland, Hungary, Ukraine, Russia (North Ossetia, Ussuri Land), China, North Korea, Canada, USA (Dominiak & Szadziewski 2010).

Biology

The only specimen recorded from Sweden was collected at Antjärn in August (Dominiak & Szadziewski 2010).

Dasyhelea (Pseudoculicoides) europaea Remm, 1962

Dasyhelea europaea Remm, 1962: 122.

New records

SWEDEN: 1 ♂, Gällivare, Muddus National Park, 67.049916° N, 20.256533° E, 443 masl, loc. 037-01, Malaise trap, 7–20 Jun. 2011, leg. H. Gustafsson (NHRS); 1 ♂, Gotland, Lärbro, 57.847400° N, 18.811216° E, 6 masl, net, 3 Jul. 2011, leg. J. Strandberg (NHRS).

Distribution

Norway, Estonia, France, Czech Republic (Dominiak & Szadziewski 2010).

Biology

Specimens collected on mire in the north of Sweden and from the vegetation in a marsh in the southeast of Sweden. It is reported as a spring–summer species, most common between May and June (Remm 1962).

Dasyhelea (Pseudoculicoides) turficola Kieffer, 1925

Dasyhelea turficola Kieffer, 1925a: 15.

Dasyhelea grenieri Clastrier, 1966: 703.

Dasyhelea malibui Yu, 2008: 165.

Distribution

Great Britain, Ireland, Sweden, Estonia, Lithuania, Russia (Kaliningrad Oblast, Ussuri Land), Poland, Czech Republic, Belgium, France, Spain (Iberian Peninsula, Canaries: Tenerife), Georgia, Morocco, Algeria, Israel (Dominiak & Szadziwski 2010).

Biology

Dasyhelea turficola larvae are known to inhabit peat bogs and moist soil close to fresh and salt-water bodies. Adults of the species visit umbelliferous flowers (Dominiak 2012). Previously, *D. turficola* have been collected in Johannisfors (Dominiak & Szadziwski 2010).

Subgenus ***Dicryptoscena*** Enderlein, 1936

Dicryptoscena Enderlein, 1936: 51. Type species *Dasyhelea inclusa* Kieffer, 1918: 188 (by original designation).

Dasyhelea (Dicryptoscena) modesta (Winnertz, 1852)

Ceratopogon modestus Winnertz, 1852: 43.

Ceratopogon aestivus Winnertz, 1852: 42.

Dasyhelea longipalpis Kieffer, 1913b: 37.

Dasyhelea inclusa Kieffer, 1918: 188.

Dasyhelea strobli Kieffer, 1919: 63.

Dasyhelea pratensis Goetghebuer, 1920: 44.

Dasyhelea bihamata Kieffer, 1923: 667.

Dasyhelea moascari Macfie, 1943: 153.

Dasyhelea densipilosa Tokunaga, 1963: 41.

Distribution

Norway, Sweden, Russia (Karelia, Leningrad Oblast, North Ossetia), Estonia, Lithuania, Great Britain, Poland, Germany, the Netherlands, Belgium, Czech Republic, France, Switzerland, Austria, Hungary, Romania, Ukraine (Crimea), Bulgaria, Andorra, Spain, Georgia, Azerbaijan, Afghanistan, Iran, China, Japan, Algeria, Egypt, Yemen (Dominiak & Szadziwski 2010).

Biology

Preimaginal stages inhabit a wide range of aquatic and semiaquatic habitats and can be found in ponds, mud, swamps, peat bogs, the littoral zone of lakes and saline habitats (Thienemann 1915, 1950; Mayer 1934; Szadziwski 1986; Przhiboro 1999; Chandler *et al.* 2008).

Dasyhelea (Dicryptoscena) notata Goetghebuer, 1920

Dasyhelea notata Goetghebuer, 1920: 47.

Dasyhelea semistriata Goetghebuer, 1921: 176.

Dasyhelea sziladyi Zilahi-Sebess, 1936: 42.

Distribution

Sweden, Finland, Estonia, Lithuania, Poland, Belgium, France, Switzerland, Czech Republic, Hungary, Romania, Spain, Georgia, Russia (Ussuri Land), North Korea, Algeria (Dominiak & Szadziwski 2010).

Biology

Adults of this species are known to visit umbelliferous flowers (Dominiak 2012).

Dasyhelea (Diryptosцена) stellata Remm, 1968

Dasyhelea stellata Remm in Remm & Zhogolev, 1968: 831.

New record

SWEDEN: 2 ♂♂, Malmö, Limhamns kalkbrott, 2-“planen”, Malaise trap, 11–25 Jun. 2009, leg. B.W. Svensson & Co. (MZLU).

Distribution

Great Britain, Poland, France, Czech Republic, Ukraine (Crimea), Russia (North Ossetia) (Dominiak & Szadziewski 2010).

Biology

These specimens were collected close to a pond in an old limestone quarry in the south of Sweden.

Dasyhelea (Dicryptoscena) thienemanni Spâtaru & Damian-Georgescu, 1970

Dasyhelea thienemanni Spâtaru & Damian-Georgescu, 1970: 425.

New records

SWEDEN: 2 ♂♂, Norrtälje, Svartsjön, 60.123098° N, 18.615078° E, 2 masl, loc. 020-01, Malaise trap, 30 Jul.–26 Aug. 2010, leg. J. Strandberg (NHRS); 2 ♂♂, Malmö, Limhamns kalkbrott, 1-“grafitti”, Malaise trap, 26 Jun.–8 Jul. 2009, leg. B.W. Svensson & Co. (MZLU).

Distribution

Estonia, Lithuania, Poland, Slovakia, Hungary, Romania, Bulgaria, Georgia, Azerbaijan (Dominiak & Szadziewski 2010).

Biology

The specimens were collected from a small peat-bog in the middle-east of Sweden and from an old limestone quarry in the south of Sweden. Preimaginal stages have previously been found in and around a spring (Spâtaru & Damian-Georgescu 1970).

Dasyhelea (Dicryptoscena) dominiakae sp. nov.

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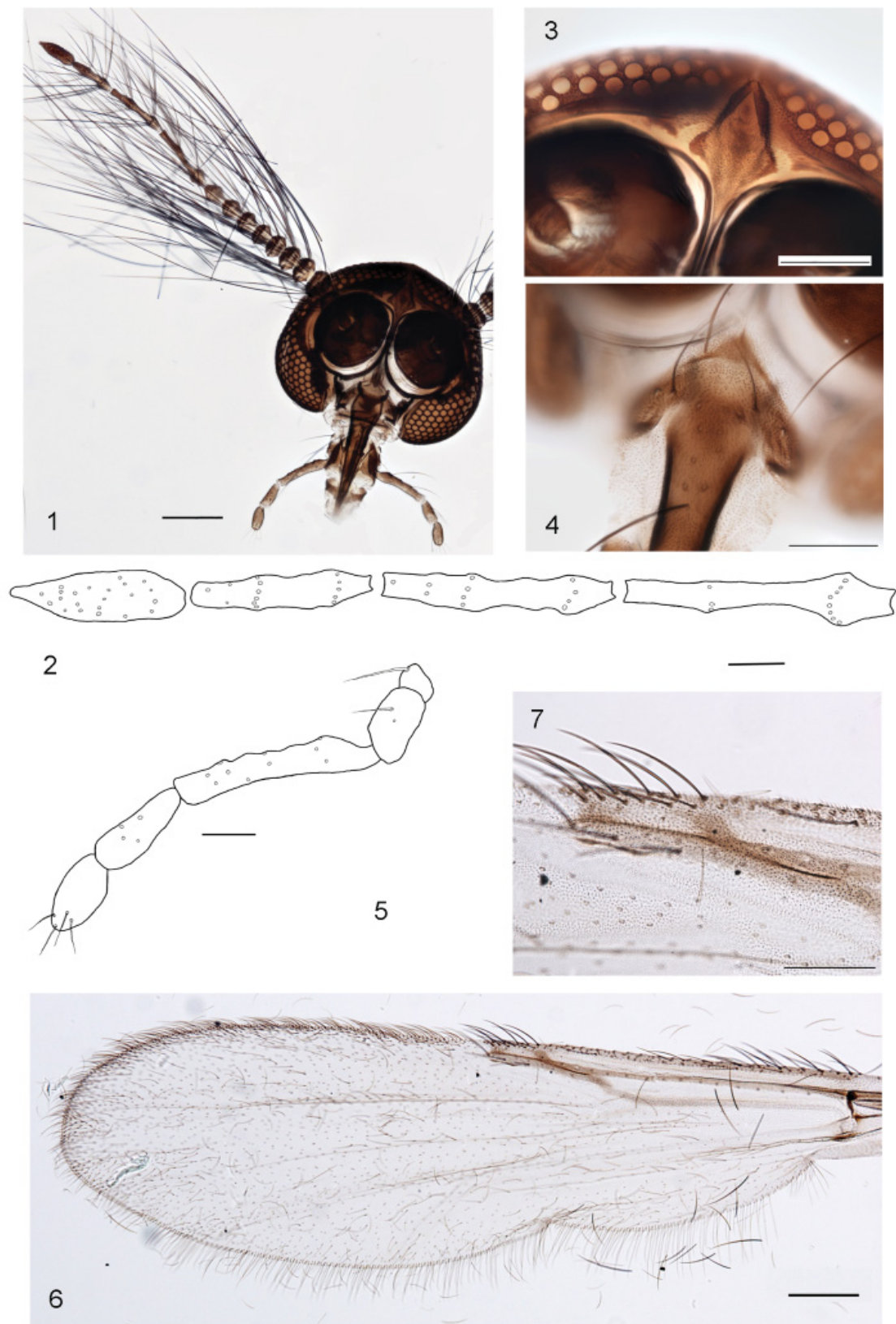
Figs 1–11

Diagnosis

The male resembles those of *D. notata* in the morphology of the genitalia, particularly by the presence of a pair of horn-like projections on the posterior margin of sternite 9. It is distinguished from *D. notata* in having an additional triangular projection on each lateral side of the posterior margin of sternite 9.

Etymology

This species is named after Dr. Patrycja Dominiak for her contributions to our knowledge of European Ceratopogonidae, notably the *Dasyhelea*.



Figs 1–7. *Dasyhelea dominiakae* sp. nov., holotype, ♂. **1.** Head. **2.** Distal flagellomeres. **3.** Frontal sclerite. **4.** Clypeus. **5.** Palp. **6.** Wing. **7.** First and second radial cell of wing. Scale bars: 1, 6 = 100 µm; 3–4, 7 = 50 µm; 2, 5 = 25 µm.

Type material

Holotype

SWEDEN: ♂, Skåne, Malmö, Limhamns kalkbrott, 2-“planen”, Malaise trap, 11–25 Jun. 2009, leg. B.W. Svensson & Co. (MZLU) (DNA voucher: 4DT).

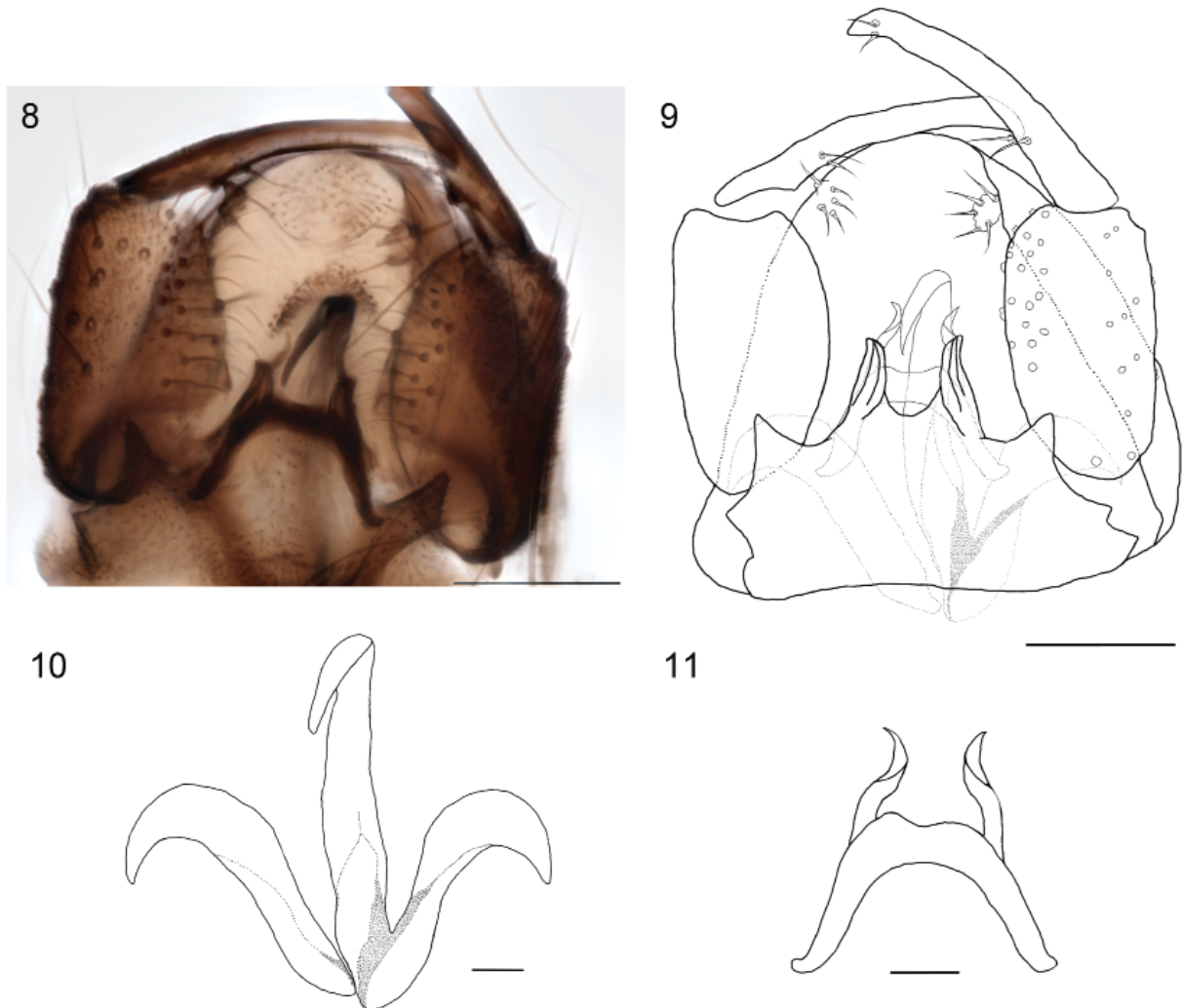
Paratypes

SWEDEN: 3 ♂♂, same data as holotype; 1 ♂, Skåne, Malmö, Limhamns kalkbrott, 1-“graffiti”, Malaise trap, 28 May–10 Jun. 2009, leg. B.W. Svensson & Co. (MZLU).

Description

Male

HEAD (Figs 1–5). Antennal flagellum length 717 μm (697–747 μm , $n = 4$); AR 1.15 (1.0–1.28, $n = 4$) (Fig. 2). Frontal sclerite rhomboid (Fig. 3). Clypeus entire, with 12 (11–12, $n = 4$) long setae (Fig. 4). Palp segment 3 slender, 95 μm (95 μm , $n = 4$); PR_(III) 5.4 (4.75–6.3, $n = 4$); first half with hyaline sensillae on inner surface (Fig. 5).



Figs 8–11. *Dasyhelea dominiakae* sp. nov., holotype, ♂. **8–9.** Ventral aspect of genitalia. **10.** Parameres. **11.** Aedeagus. Scale bars: 8–9 = 50 μm ; 10–11 = 16 μm .

THORAX (Figs 6–7). Scutellum pale, with 12 bristles (8–11, $n = 4$). Wing length 1.15 mm (1.02–1.17 mm, $n = 4$); CR 0.45 (0.46–0.52, $n = 4$); macrotrichia numerous (Fig. 6); first radial cell slit-like, second cell open (Fig. 7). Legs brown, except tarsi pale brown.

GENITALIA (Figs 8–11). Apicolateral process of tergite 9 short, with five short bristles. Posterior margin of sternite 9 with triangular projection on each lateral side and a pair of horn-like projections. Gonostylus straight, basally broad, apically slender, proximal part covered by small setae, two long bristles at midpoint present (Figs 8–9). Parameres asymmetrical. Posterior process of parameres fused to right arm, tapering evenly along its length, evenly curved dorsad (Fig. 10). Aedeagus high arched, with apicolateral processes twisted along its length, tapering apically (Fig. 11).

Female

Unknown.

Remarks

Dasyhelea dominiakae sp. nov. is a member of the subgenus *Dicryptoscena* and is similar to *D. notata* and *D. modesta*. What distinguishes this species from those mentioned above, as well as other European species of *Dicryptoscena*, is the presence of triangular projections located on sternite 9. The male of *D. dominiakae* sp. nov. further differs from *D. notata* in having an evenly shaped posterior process and it is also separated from *D. modesta* by the equal length of the fourth and fifth palpal segments.

Biology

The holotype and paratypes were collected with Malaise traps in an old limestone quarry in the south of Sweden during May–June, among *Salix caprea* Linnaeus next to a pond.

Dasyhelea (Dicryptoscena) gothlandica sp. nov.

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Figs 12–32

Diagnosis

The male genitalia of this species are characteristic in having the posterior margin of sternite 9 with a pair of processes apically separated by a shallow furrow. Gonostyli short, tapering to an indented sharp point. The aedeagus has broad apicolateral processes, and the posterior process of the paramere has fine hairs apically.

Etymology

Gothlandica refers to Gotland, a calcareous island located in the Baltic Sea east of mainland Sweden, where the holotype was collected.

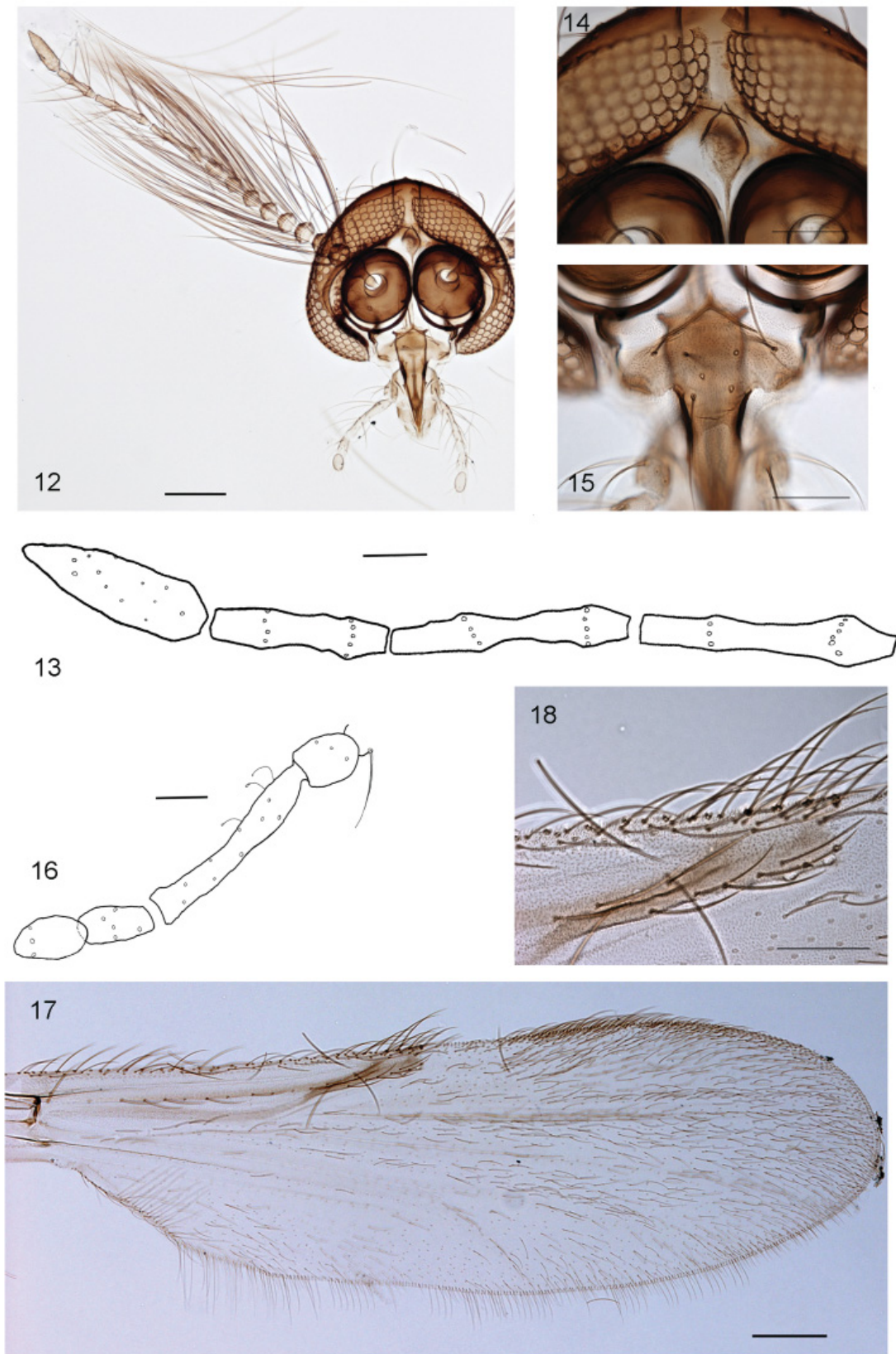
Type material

Holotype

SWEDEN: ♂, Gotland, Bästeträsk, 57.899383° N, 18.901083° E, 9 masl, Malaise trap, 28 May–12 Jun. 2011, leg. B. Eklund (NHRS) (DNA voucher: 4BA).

Paratypes

SWEDEN: 2 ♂♂, 2 ♀♀, same data as holotype; 1 ♂, Gotland, Horsan, 57.865883° N, 18.846350° E, 4 masl, Malaise trap, 10–25 Jul. 2011, leg. B. Eklund (NHRS); 1 ♂, 2 ♀♀, Gotland, Bästeträsk, 57.899383° N, 18.901083° E, 9 masl, sweep net, 3 Jul. 2011, leg. J. Strandberg (NHRS) (DNA voucher: 6AW).



Figs 12–18. *Dasyhelea gothlandica* sp. nov., holotype, ♂. **12.** Head. **13.** Distal flagellomeres. **14.** Frontal sclerite. **15.** Clypeus. **16.** Palp. **17.** Wing. **18.** First and second radial cell of wing. Scale bars: 12, 17 = 100 µm; 14, 18 = 50 µm; 13, 15–16 = 25 µm.

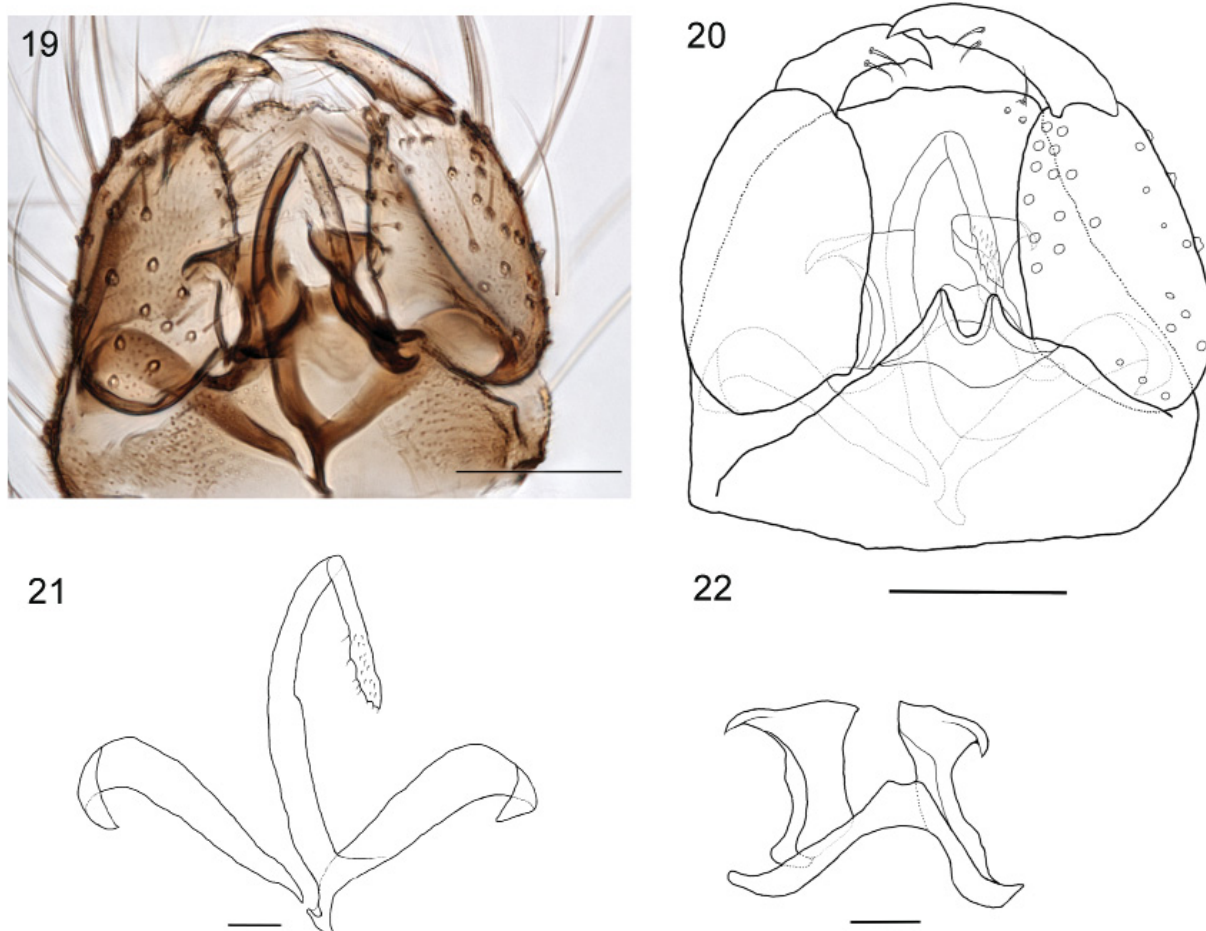
Description

Male

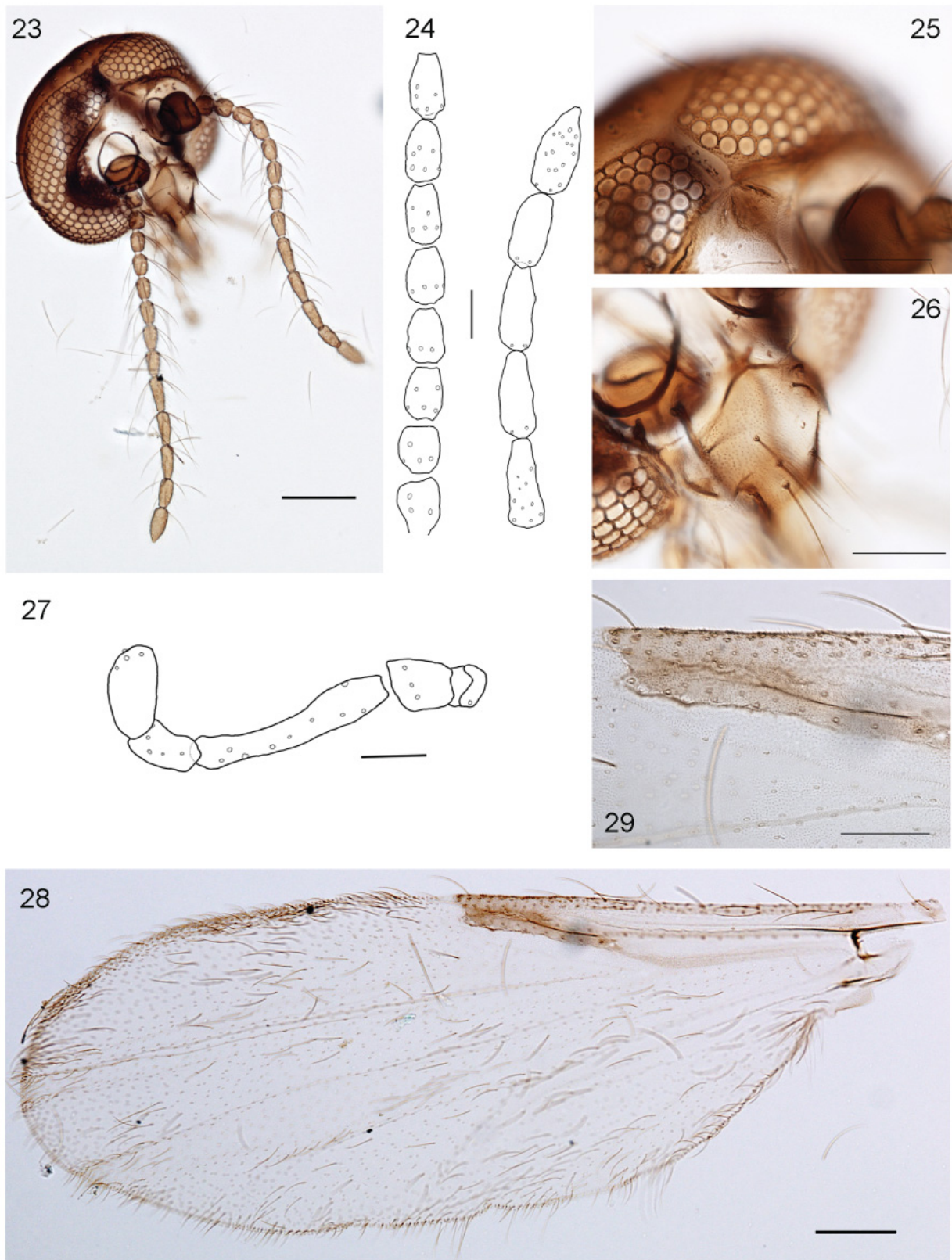
HEAD (Figs 12–16). Antennal flagellum length 727 μm (687–727 μm , $n = 4$); AR 1.06 (0.97–1.19, $n = 4$) (Fig. 13). Frontal sclerite elliptical (Fig. 14). Clypeus entire, with 8 (6–8, $n = 4$) long setae (Fig. 15). Palp segment 3 slender, 90 μm (85–91 μm , $n = 4$); $\text{PR}_{(\text{III})}$ 6.6 (6.3, $n = 4$) (Fig. 16); first half with hyaline sensillae on inner surface.

THORAX (Figs 17–18). Scutellum pale, with 10 bristles (9–10, $n = 4$). Wing length 1.15 (1.08–1.17 mm, $n = 4$); CR 0.45 (0.46–0.48, $n = 4$); macrotrichia numerous (Fig. 17); first radial cell slit-like, second cell open (Fig. 18). Legs light brown, tarsi paler.

GENITALIA (Figs 19–22). Apicolateral process of tergite 9 short. Posterior margin of sternite 9 apically divided into pair of obtuse projections. Gonostylus short, tapering to indented sharp point, covered by small setae, two long bristles at midpoint present (Figs 19–20). Parameres asymmetrical; posterior process fused with right arm; long and slender, distinctly bent apically, with fine apical hairs (Fig. 21). Aedeagus low arched with apicolateral processes broad, somewhat folded, extended laterally in distal part (Fig. 22).



Figs 19–22. *Dasyhelea gothlandica* sp. nov., holotype, ♂. **19–20.** Ventral aspect of genitalia. **21.** Parameres. **22.** Aedeagus. Scale bars: 19–20 = 50 μm ; 21–22 = 16 μm .



Figs 23–29. *Dasyhelea gothlandica* sp. nov., paratype, ♀. **23.** Head. **24.** Flagellomeres. **25.** Frontal sclerite. **26.** Clypeus. **27.** Palp. **28.** Wing. **29.** First and second radial cell of wing. Scale bars: 23, 28 = 100 µm; 25–26, 29 = 50 µm; 24, 27 = 25 µm.

Female

HEAD (Figs 23–27). Antennal flagellum length 545 μm (444–525, $n = 3$); distal flagellomeres elongate; AR 0.96 (0.86–1.0, $n = 3$) (Fig. 24). Clypeus entire, with 8 ($n = 3$) long setae (Fig. 25). Frontal sclerite elliptical (Fig. 26). Palp segment 3 slender, 80 μm (80 μm , $n = 4$); $\text{PR}_{(\text{III})}$ 5.6 (5.3, $n = 3$) (Fig. 27); with hyaline sensillae at basal part of inner surface.

THORAX (Figs 28–29). Scutellum pale, with 8 bristles (9–10, $n = 3$). Wing length 1.1 mm (1.05–1.13, $n = 3$); CR 0.46 (0.44–0.47, $n = 3$) (Fig. 28). First radial cell slit-like, second cell open but small (Fig. 29). Legs as in male.

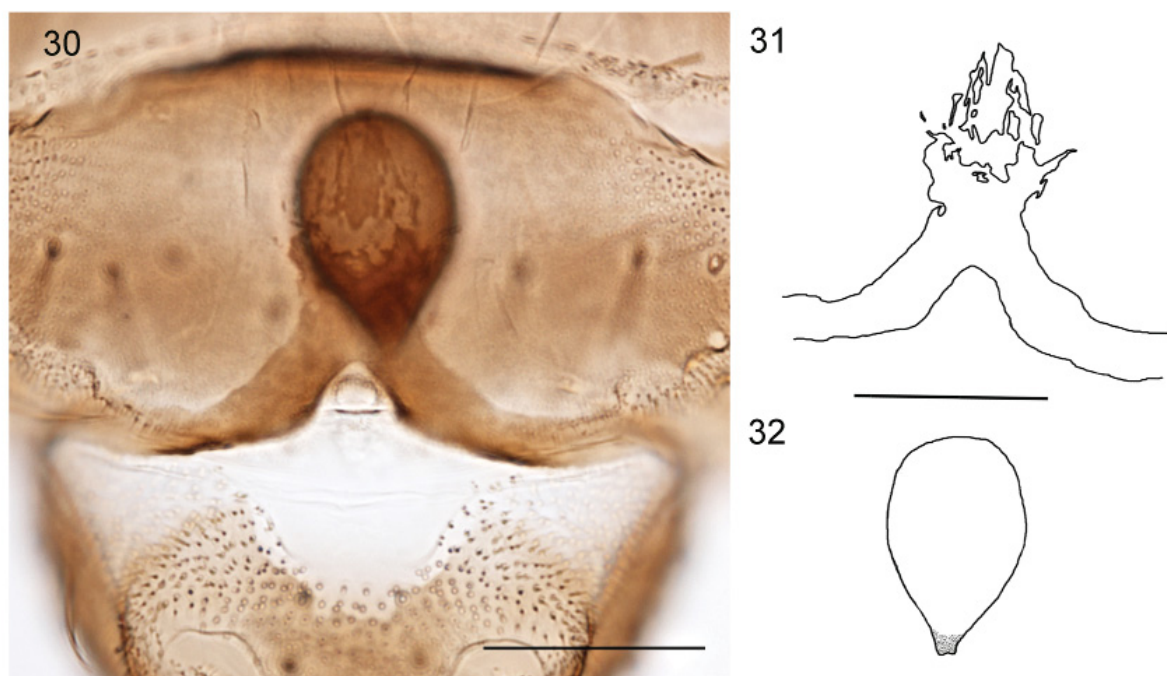
GENITALIA (Figs 30–32). Subgenital plate with notum separated from ramus, slightly fragmented (Figs 30–31). Spermatheca single; ovoid-shaped with short neck; length $\times$ width: 60 $\times$ 40 μm (60 $\times$ 40 μm , $n = 3$) (Fig. 32).

Remarks

This species is a member of the subgenus *Dicryptoscena*, and the male is similar to that of *Dasyhelea albidipes* Santos Abreu, 1918 in the morphology of the genitalia, particularly by the presence of a pair of processes on the posterior margin of sternite 9. *D. gothlandica* sp. nov. differs from *D. albidipes* by the broadly shaped apicolateral processes and the short gonostyli.

Biology

The holotype was collected in a Malaise trap next to Lake Bästeträsk, with surrounding vegetation consisting of *Pinus sylvestris* Linnaeus and small shrubs. One of the male paratypes was collected in a Malaise trap next to Lake Horsan, approximately 5 km south-east of Bästeträsk.



Figs 30–32. *Dasyhelea gothlandica* sp. nov., paratype, ♀. **30–31.** Subgenital plate. **32.** Seminal capsule. Scale bars = 50 μm .

Subgenus *Sebessia* Remm, 1979

Sebessia Remm, 1979: 55. Type species: *Dasyhelea flavopyga* Zilahi-Sebess, 1940: 49 (by original designation).

Dasyhelea (Sebessia) acuminata Kieffer, 1919

Dasyhelea acuminata Kieffer, 1919: 60.

Dasyhelea polita Edwards, 1921: 124.

Dasyhelea verticillata Kieffer, 1925a: 63.

Dasyhelea littoralis Goetghebuer, 1934: 289.

New records

SWEDEN: 1 ♂, Mörbylånga, Frösslunda alvar, northeastern part, 56.547450° N, 16.577250° E, Trap ID 20, collecting event 1498, Malaise trap, 5 Jul.–2 Aug. 2005, leg. Swedish Malaise Trap Project (NHRS); 3 ♀♀, Gotland, Lärbro, 57.847400° N, 18.811216° E, 6 masl, net, 3 Jul. 2011, leg. J. Strandberg (NHRS).

Distribution

Great Britain (Scotland), Estonia, Belgium, France, Czech Republic, Hungary, Bulgaria (Dominiak & Szadziewski 2010).

Biology

The male was collected next to a pasture and the females from the vegetation in a marsh.

Discussion

The two new species belong to the subgenus *Dicryptoscena* and together with the new records the Swedish *Dasyhelea* fauna now contains 20 species, representing the five subgenera, i.e., *Dasyhelea* (6 spp.), *Dicryptoscena* (5 spp.), *Prokempia* (2 spp.), *Pseudoculicoides* (6 spp.) and *Sebessia* (1 sp.). The number of *Dasyhelea* species in neighboring countries ranges from 8 for Finland (Huldén & Huldén 2014), to 11 for both Norway and Germany (Stur & Borkent 2014; Szadziewski *et al.* 2012), 12 for Lithuania, and 30 in both Estonia and Poland (Szadziewski *et al.* 2012). According to Peterson & Achim (2001) there are 4 species likely to occur in Denmark based on distributional patterns, and Remm (1988), without locality data, lists *Dasyhelea dampfi* as having a distribution that includes Latvia. Comparing the species composition between neighbouring countries, there are now six species present in Sweden that have also been reported from either Norway or Finland. The species *D. bensoni*, *D. bilineata* and *D. modesta* are present in all three countries. Sweden shares 13 species with Estonia and Poland of which 8 are present in all three countries (Szadziewski *et al.* 2012). *Dasyhelea flavoscutellata* (Zetterstedt, 1850) has not been recorded from Sweden but is present in all the countries mentioned above except Lithuania, Denmark and Latvia, and is therefore likely to live in Sweden as well. Most of the new records for Sweden have been collected from the southern parts of the country and only two records are from a northern locality (Muddus National Park). The diversity from a major part of Sweden is thus poorly known and could probably yield many more species. The substantial increase of *Dasyhelea* species in Sweden probably signals that the knowledge of *Dasyhelea* in particular and Ceratopogonidae in general is poor.

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